USDA-ARS MBr Alternative Area-Wide Project-South Atlantic Region: Forest Tree Nurseries

Objective: To evaluate the effects of a number of MBr alternatives in large demonstration plots that had previously shown promise in small-scale plots on:

- Loblolly pine production
- Soil-borne fungi
- Weed control
- Plant parasitic nematodes

USDA-ARS South Atlantic Area-wide Trials: 2007-2012

MBr Alternative	Components	Rate (lb/acre)	Plastic	# of Trials
Chloropicrin	100% Chloropicrin	100, 150, 200, 250, 300	HDPE, LDPE, VIF, TIF	8
Pic +®	85% Chloropicrin & 15% solvent A	100, 150, 200, 250, 300	HDPE, LDPE, VIF, TIF	8
Chlor 60	60% Chloropicrin & 40% 1,3 D	100, 150, 200, 250, 400	HDPE, LDPE, VIF, TIF	8
DMDS & Chlor (Paladin®)	79% DMDS & 21% Chloropicrin	70 (gal/acre)	HDPE	6
New Pic +	85% Chloropicrin & 15% solvent B	300	HDPE	2
Midas® 98/2	98% methyl iodide & 2% Chloropicrin	100	VIF	1
Midas® 50/50	50% methyl iodide & 50% Chloropicrin	160	VIF	1

Methodology

- MBr alternatives tested in 7 different nurseries / soils.
- Trials spanned 2-3 year growing cycles.
- Randomized complete block design with 4 replications.
- Data collected in each nursery included the following:

Data	**# Times per season**	**Timing**
Seedling density	3	post-sowing/mid-summer/lifting
Trichoderma	2	post-sowing/lifting
Nematodes	2	post-sowing/lifting
Seedling dry weight	1	lifting
Root collar diameter	1	lifting
Height	1	lifting
Root morphology*	1	lifting

*root length, root diameter, root volume, and number of root tips

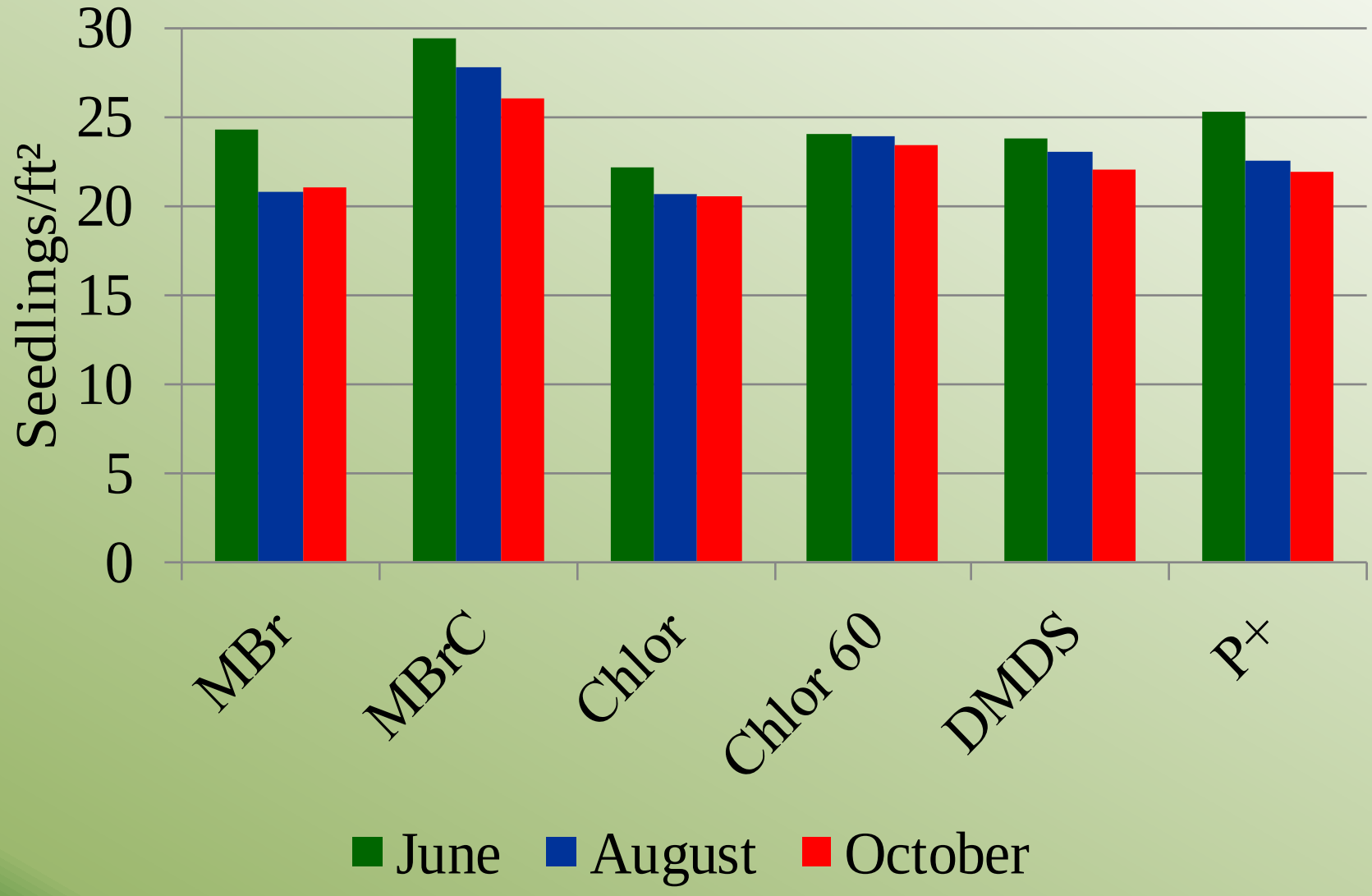
Update on Current Area-wide Trials

Camden, AL

2009 Trial-Fumigation Treatments-Camden, AL

Fumigant	Rate (lb/acre)	Components
MBr	350	67% MBr & 33% Chloropicrin
MBrC 70/30	400	70% MBr (98/2) & 30% Solvent
Chloropicrin	300	100% Chloropicrin
Chlor 60	400	60% Chloropicrin & 40% 1,3-D
Pic +®	300	85% Chloropicrin & 15% Solvent A
DMDS + Chlor	70 (gal/acre)	79% DMDS & 21% Chloropicrin
Midas® 98/2	100	98% methyl iodide & 2% Chloropicrin
Midas® 50/50	160	50% methyl iodide & 50% Chloropicrin

2009 Trial: 3rd Growing Season (2011)-Seedling Density



At the end of the 3rd growing season……..

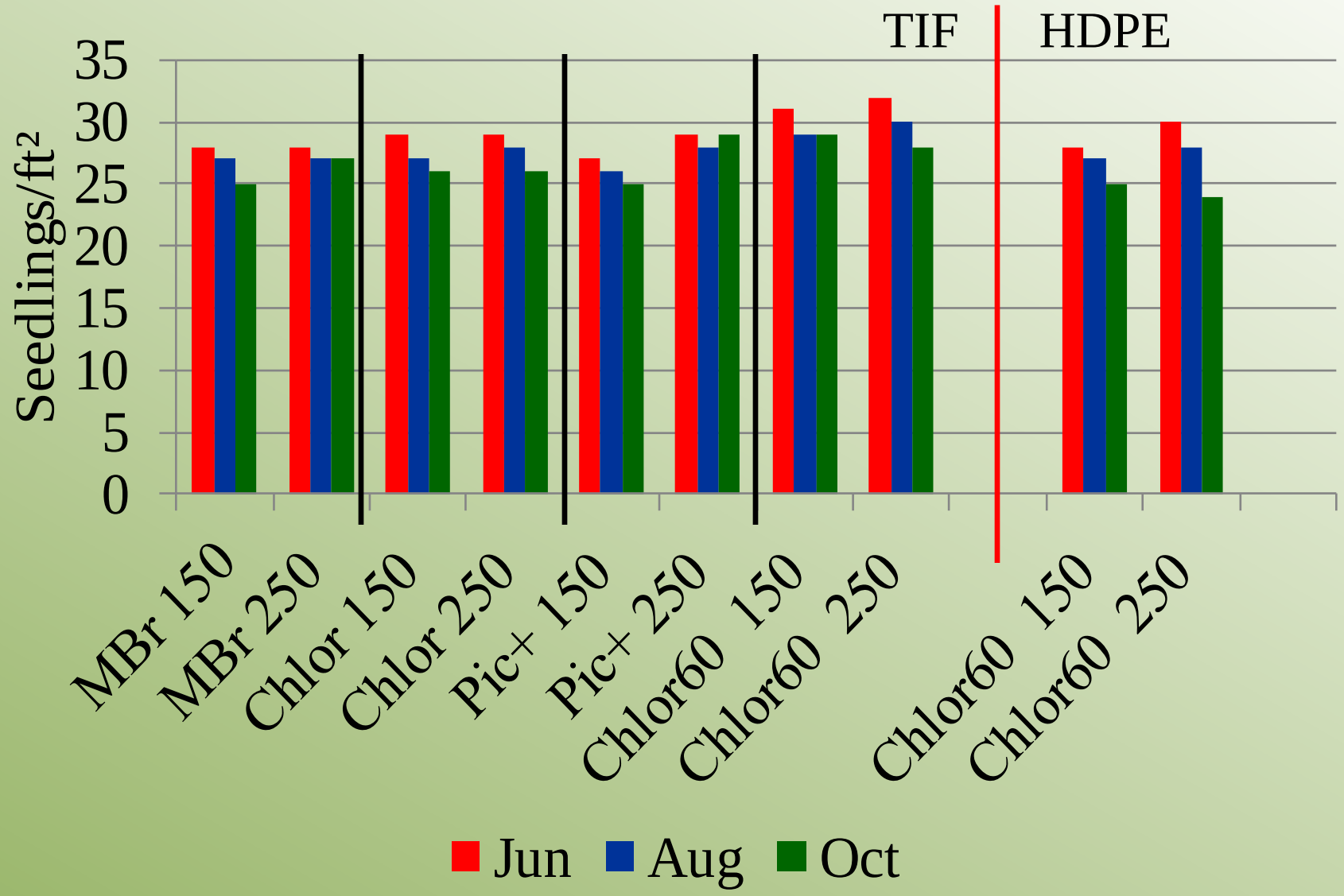
- In the 2009 trial, there were no differences between the MBr alternatives tested for the following measurements:
  - Root weight ratio
  - Root length
  - Root surface area
  - Root diameter
  - Root volume
  - Root tip number
  - Seedling density
  - *Trichoderma* colony forming units


8 acres
Weyerhaeuser
Camden, AL
Area-wide Trial-Camden, AL
2010-2012
© 2010 Google
Pointer 32°04'04.39" N 87°20'41.01" W elev 227 ft
Streaming 100%
Eye alt 4600 ft

2010 Trial-Fumigation Treatments-Camden, AL

Fumigant	Rate (lb/acre)	Component	Plastic
MBr	150	80% MBr & 20% Chloropicrin	TIF
	250		
Chloropicrin	150	100% Chloropicrin	TIF
	250		
Chlor 60	150	60% Chloropicrin & 40% 1,3-D	TIF
	250		
Pic +®	150	85% Chloropicrin & 15% Solvent A	TIF
	250		
Chlor 60	150	60% Chloropicrin & 40% 1,3-D	HDPE
	250		

2010 Trial-2nd Growing Season (2011)-Seedling Density



At the end of the 2nd growing season……..

- In the 2010 trial, there were no differences between the MBr alternatives tested for the following measurements:
  - Root weight ratio
  - Root length
  - Root surface area
  - Root volume
  - Root tip number

Fall 2012 will mark the end of the 2010 trial's 3rd growing season.

Seedlings will be lifted at that time and root collar diameter, height, root morphology, dry biomass, and seedling density will be measured.

Comments on MBr Alternatives

Midas®

methyl iodide & chloropicrin

Pulled off the US Market.

New Pic +

(85% chloropicrin & 15% solvent B)

- New solvent in this formulation.
- It did not control annual sedge and was dropped from further testing.

Chlor 60

60% chloropicrin & 40% 1,3 dichloropropene

- This alternative has performed comparatively well to MBr in our trials.
- Nutsedge control is lacking.
- Nursery managers may choose this alternative if they have a nematode problem and nutsedge is not an issue.

Top 3 MBr Alternatives (as of October 2011)

1. Pic +® (85% chloropicrin & 15% solvent A)
2. Chloropicrin (100% chloropicrin)
3. DMDS & Chloropicrin (79% dimethyl disulfide & 21% chloropicrin)

Based on:

- Seedling quality data, root morphology, *Trichoderma* levels and no excessive nematode or weed problems.
- Using VIF and TIF

Notes:

- The unpleasant odor of DMDS may limit its acceptance as a MBr alternative by some nursery managers.

Management Implications

- We have identified some alternatives that act as decent pesticides and produce quality seedlings.
- Any choice of current alternatives will likely require an increased use of pesticides to compensate for alternative short falls.
- The long term effects of the best alternatives are unknown.
- An alternative that works well in one nursery may not be as effective in another nursery.

Management Implications

- A good starting point with high barrier plastics such as TIF or VIF in broadcast applications has been important.
  - Rate with VIF/TIF = $\frac{\text{Old Rate under HDPE/LDPE}}{2}$
- A alternative becomes more effective when chloropicrin (>20%) is included.
  - DMDS vs. DMDS & Chloropicrin (Paladin®)
  - Telone vs. Telone & Chloropicrin (Chlor60)


Questions?